CLAIMS

1. 1. A file server system for a computer having a processor, a memory coupled to the

2. processor, and a system bus to which the processor and memory are coupled, the com-

3. puter being configured to implement a file system, the file server system comprising:

4. (A) a storage operating system adapted to be executed by the processor;

5. (B) a removable nonvolatile memory device coupled to the system bus, the

6. removable nonvolatile memory device containing diagnostics code for the system; and

7. (C) a set of boot instructions resident in the filer server system including in-

8. structions for executing a normal boot routine upon a power-on of the system, and in-

9. cluding instructions enabling the processor to identify the removable nonvolatile memory

10. device and to load the diagnostics code into the memory in response to a command to

11. execute a diagnostics boot routine instead of the normal boot routine.

1. 2. The system as defined in claim 1 wherein the removable nonvolatile memory de-

2. vice is a compact flash, the compact flash being divided into a plurality of partitions with

3. the diagnostics code residing in at least one of the partitions.

1. 3. The system as defined in claim 2 wherein one of the partitions of the compact

2. flash is designated as a maintenance log into which test results and data are stored.

1. 4. The system as defined in claim 2 further comprising:

2. (A) a input/output device coupled to the system bus, and which input/output

3. device is identifiable by the processor; and

4. (B) a second bus coupled between the input/output device and the compact

5. flash in such a manner that when the processor identifies the input/output device, the

6. compact flash is, in turn, initialized and the diagnostics code is executed upon a com-

7. mand to run a diagnostics boot routine.

1. 5. The system of claim 1 further comprising:

2. (A) a storage adapter coupled to the system bus; and

3   at least one storage disk coupled to the storage adapter and containing files served by the

4   operating system.

1   6.   The system as defined in claim 5 further comprising a plurality of storage

2   disks coupled to the storage adapter and data on the disks being stored in a write any-

3   where file layout system.

1   7.   The system as defined in claim 1 further comprising a motherboard upon

2   which the processor, the memory and the set of boot instructions reside.

1   8.   The system as defined in claim 7 wherein the removable nonvolatile memory de-

2   vice containing the diagnostics code is resident external to the motherboard, and the di-

3   agnostics code on the removable nonvolatile memory device is adapted to be upgraded or

4   amended free of taking the system out of service.

1   9.   The system as defined in claim 1 wherein said diagnostic code includes code re-

2   lating to the diagnostics of hardware devices including the processor, the memory, the

3   buses, the adapters, the disks, the compact flash and interfaces thereof.

1   10.   The system as defined in claim 1 wherein said boot instructions reside in firm-

2   ware.

1   11.   A method of performing diagnostics in a filer server system, the filer server sys-

2   tem having a processor, a memory coupled to the processor and having memory locations

3   addressable by the processor, a storage operating system adapted to be executed by the

4   processor, system firmware containing instructions for power-on self tests, a set of boot

5   instructions including instructions for executing a normal boot routine upon a power-on

6   of the system after the power-on self test is completed, the method comprising the steps

7   of:

8   (A)   providing a removable nonvolatile memory device interfaced with the

9   motherboard, the removable nonvolatile memory device being identifiable to the proces-

10   sor;

11   (B)   dividing the removable nonvolatile memory device into separate memory

12   partitions;

13   (C)   storing a set of diagnostics instructions, being a diagnostics code, in one of

14   the partitions of the removable nonvolatile memory device; and

15   (D)   programming the system firmware to recognize a user implemented com-

16   mand for a diagnostics boot such that in response to the diagnostics boot command, the

17   firmware loads the diagnostics code residing in the removable nonvolatile memory de-

18   vice into the memory to execute a diagnostic boot routine instead of a normal boot rou-

19   tine.

1   12.   The method as defined in claim 11 including the further step of

2   (E)   maintaining, in a separate partition of the removable nonvolatile memory

3   device, a maintenance log into which diagnostic test results data and data about the stor-

4   age system are stored.

1   13.   The method as defined in claim 11 including the further step of:

2   selecting as the removable nonvolatile memory device, a compact flash.

1   14.   The method as defined in claims 11 including the further step of:

2   selecting as the removable nonvolatile memory device a personal computer (PC)

3   card.

1   15.   The method as defined in claim 11 including the further step of:

2   upgrading the diagnostics code without taking the file server out of service.

1   16.   A storage system for a computer configured to implement a file system, the stor-

2   age system having a processor, a memory coupled to the processor and having memory

3   locations addressable by the processor, a system bus to which the memory and the proc-

4 essor are coupled, an operating system adapted to be executed by the processor, system

5 firmware containing instructions for power-on self tests and a set of instructions for exe-

6 cuting a normal boot routine upon a power-on of the system after a power-on self test is

7 completed, the storage system comprising:

8   (A)   means for storing a set of diagnostics instructions comprising diagnostics

9 code, in a removable nonvolatile memory device coupled to the system bus, the remov-

10 able nonvolatile memory device being identifiable to the system; and

11   (B)   means for executing the diagnostics code in response to a diagnostics boot

12 command received by system firmware.

1 17.   The storage system of claim 16 further comprising:

2   means for coupling the removable nonvolatile memory device to the processor in

3 such a manner that the diagnostics code may be upgraded without taking the storage sys-

4 tem out of normal service.

1 18.   The storage system of claim 17, further comprising:

2   means for upgrading the diagnostics code by interfacing with the storage system

3 through an associated input/output interface.

1 19.   A computer-readable medium operating on a computer in a network that includes

2 one or more storage systems sharing volumes, the computer-readable medium including

3 program instructions for performing the steps of:

4   (A)   initiating a power-on self test when the computer is powered-on;

5   (B)   identifying devices present in the computer;

6   (C)   in response to a successful power-on self test, commencing a normal boot

7 routine;

8   (D)   recognizing a command for a diagnostics boot;

9   (E)   in response to the diagnostics boot command, probing devices to locate a

10 removable nonvolatile memory device containing diagnostic boot instructions; and

11   (F)   interrupting the normal boot routine and executing the diagnostics code for

12 a diagnostics boot for the computer.

1 20.   The computer readable medium as defined in claim 19 including the further in-

2 struction to identify a compact flash as the removable nonvolatile memory device in

3 which diagnostics code for the computer is stored.

1 21.   The computer readable medium as defined in claim 20 including further instruc-

2 tions to save diagnostics test results and other data in a predetermined address location in

3 the compact flash associated with the computer.

1 22.   The computer readable medium as defined in claim 21 wherein the diagnostics

2 boot command is initiated by a human maintenance operator.

1 23.   The computer readable medium as defined in claim 21 wherein the diagnostics

2 boot command is initiated as an instruction in the computer readable medium upon the

3 occurrence of a predetermined event.

1 24.   A diagnostic system for use with a storage system comprising:

2   a removable nonvolatile memory device interconnected with the storage system,

3 wherein the removable nonvolatile memory device containing boot diagnostic code that

4 is loadable into the storage system as an alternative to a normal boot routine.

1 25.   The diagnostic system of claim 24, wherein the removable nonvolatile memory

2 device further comprises a plurality of partitions.

1 26.   The diagnostics system of claim 25, wherein the boot diagnostic code is contained

2 within a first partition of the plurality of partitions.

1 27.   The diagnostic system of claim 26, wherein the removable nonvolatile memory

2 device further comprises a second partition, the second partition storing a diagnostic log.

1 28.   The diagnostic system of claim 24, wherein the removable nonvolatile memory

2 device is a PC card.

H:\112\056\0021\PROSECUT\0021.doc 02/07/02 9:38 AM

1   29.   The diagnostic system of claim 24, wherein the removable nonvolatile memory

2   device is a compact flash.

1   30.   The diagnostic system of claim 24, wherein the storage system further comprises

2   a firmware boot routine, the firmware boot routine having a process for selecting between

3   execution of either a normal boot routing or a diagnostic boot routine.

1   31.   A file server system for a computer having a processor, a memory coupled to the

2   processor, and a system bus to which the processor and memory are coupled, the com-

3   puter being configured to implement a file system, the file server system comprising:

4   (A)   a storage operating system adapted to be executed by the processor;

5   (B)   a removable nonvolatile memory device coupled to the system bus, the

6   removable nonvolatile memory device containing diagnostics code for the system, the

7   removable nonvolatile memory device also divided into a plurality of partitions with the

8   diagnostics code residing in at least one of the partitions; and

9   (C)   a set of boot instructions resident in the filer server system including in-

10   structions for executing a normal boot routine upon a power-on of the system, and in-

11   cluding instructions enabling the processor to identify the removable nonvolatile memory

12   device and to load the diagnostics code into the memory in response to a command to

13   execute a diagnostics boot routine instead of the normal boot routine.

1   32.   The system of claim 29 wherein one of the partitions is designated as a mainte-

2   nance log into which test results and data are stored.

1   33.   The system of claim 29 further comprising:

2   a separate storage medium, the separate storage medium storing a boot routine.

1   34.   The system of claim 31, wherein the separate storage medium is a partition on the

2   removable nonvolatile memory device.